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BEFORE THE

Federal Communications Commission

WASHINGTON, D.C. 20554

In the matter of

Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Service and Modify the Policies Governing Them	)	PR Docket 92-235

To: The Commission

COMMENTS OF THE ACADEMY OF MODEL AERONAUTICS

Respectfully submitted,

ACADEMY OF MODEL AERONAUTICS, INC.

By Raymond A. Kowalski
Raymond A. Kowalski
Its Counsel

Keller and Heckman
1001 G St., N.W., Suite 500 West
Washington, D.C. 20001
(202)434-4100

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EXECUTIVE SUMMARY

The Commission's proposals for the 72-76 MHz band will have a disastrous effect on the R/C industry, which has annual sales in excess of $1 billion, as well as on an estimated one million R/C modeling enthusiasts.

As a result of proposed channel splitting, there would be land mobile channels within 2.5 kHz of more than half of the R/C channels at 72 and 75 MHz, whereas, at present, land mobile channels are 10 kHz removed from R/C channels. This would be close enough to the R/C frequency to cause the lower-powered R/C transmitter to lose control of the model in operation.

Just when the R/C industry is about to complete its own equipment conversion to enable the maximum, safe use of its full allotment of channels, the Commission is proposing rules that would make more than half of those channels unsafe for reliable control of expensive and potentially dangerous radio-controlled models.

The Academy urges the Commission to restore the reference to R/C modeling to the rules in Part 88 and to preserve the 10 kHz separation of all R/C channels from land mobile channels.

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COMMENTS OF THE ACADEMY OF MODEL AERONAUTICS

The Academy of Model Aeronautics, Inc. ("Academy"), by its counsel and pursuant to Section 1.415 of the Commission's rules, submits these comments in the above-captioned proceeding. The Academy will show below that the Commission's proposals for the 72-76 MHz band will have a disastrous effect on an industry with annual sales in excess of $1 billion as well as on an estimated one million Radio Control modeling enthusiasts.

The Interest of the Academy

1. The Academy is the oldest and largest association of model aviation enthusiasts in the United States. The Academy was founded in 1936 and presently has its headquarters in Reston, Virginia. In a few months the Academy will move to a new headquarters/flying site/museum complex in Muncie, Indiana. The Academy has 172,000 members

and publishes a monthly magazine, "Model Aviation." The Academy sponsors and sanctions over 2,500 events, competitions, tournaments and conventions, which are held throughout the United States. The Academy charters some 2,400 clubs, whose members pursue this hobby/sport at over 4,000 flying sites around the country.

2. A major objective of the Academy is to promote the enjoyment of the hobby and sport of aeromodeling. There are many forms of aeromodeling, ranging from super lightweight free-flight models that are propelled by a rubber band, through large, radio-controlled, engine-driven model aircraft that may weigh 20 pounds or more, and even model rockets. Another objective of the Academy is the education of aviation enthusiasts in the history and principles of flight.

3. There are as many different participants in aeromodeling as there are types of models. Certainly young people are as interested in aeromodeling as they are in computing, amateur radio and other technical pursuits. But a substantial number of modeling enthusiasts are adults who take this pursuit very seriously. From astronauts to aircraft designers, this activity draws people who invest

considerable time, talent and money in the creation and operation of radio controlled models.

4. Nor is aeromodeling limited to hobby flying. The military has made extensive use of model radio control technology for over twenty years in the development of Remotely Piloted Vehicles ("RPVs"), sometimes referred to as Unmanned Aerial Vehicles ("UAVs"). Model radio control equipment has been shown to be a sophisticated yet low cost alternative for many scale size research projects. The technology has even found its way to Hollywood, where it is extensively used in special effects.

5. The Academy promulgates a safety code for its members that covers model aircraft operating procedures to safeguard participants, spectators and surrounding property, and to coordinate the use of radio control equipment on authorized frequencies. The Academy's efforts in this regard benefit not only its 172,000 formal members, but also an estimated million more aero and non-aero modelers who are not members but who also participate in radio-controlled modeling.

6. The use of radio frequency devices to control models in flight is an essential element of the aeromodeling

sport. The Commission has established the Radio Control (R/C) Radio Service where it has allocated frequencies exclusively for the control of model aircraft and model surface craft devices. The R/C Radio Service is governed by Part 95, Subparts C and E of the Commission's rules.

7. Over the years the Academy has worked closely with the Commission to promote the maximum safe utilization of the channels allocated to the R/C Radio Service. Although the primary emphasis of the Academy is model aircraft, the Academy has often spoken on behalf of the entire R/C community, since the interests of modelers often coincide, regardless of whether they operate model aircraft, boats or wheeled vehicles.

8. Fifteen years ago the Academy petitioned the Commission for spectrum to support this rapidly-growing hobby. Eventually the Commission established 80 channels in the 72-76 MHz band, spaced 20 kHz apart, for the Radio Control Radio Service. At the time these channels were granted, R/C equipment did not exist that would operate reliably at 20 kHz spacing. Over the years, the manufacturers of R/C equipment have introduced and refined the equipment necessary to operate on these channels and R/C

modeling has flourished. The 72-76 MHz band has become the most heavily utilized R/C band.

9. Growth in the service has been so phenomenal that efforts had to be undertaken to improve the operating characteristics of the radio equipment, so as to maximize the use of all channels without necessitating additional spectrum. Most recently, the Academy has worked to promote the voluntary conversion of R/C equipment to so-called "narrow band" standards, so that full use may be made of the full complement of R/C frequencies. Begun in 1988, this long-term effort to produce equipment that will operate reliably at 20 kHz separation will result in the universal implementation of spectrum-efficient, narrow band technology by 1996. This demonstrates that the R/C community supports the narrow band channel concept, so it is ironic that the proposed splitting of land mobile channels into narrow band channels now threatens over half of the R/C frequencies.

10. The Academy worked closely with the Commission in the narrow banding project, even to the extent of requesting the Commission to formalize the tighter operating tolerances that the industry had voluntarily adopted. It therefore comes as a shock that the Commission would propose a frequency plan in this proceeding that stands to nullify

years of cooperative effort that has resulted in a high quality, reliable and safe R/C Radio Service.

The Present Rules at 72-76 MHz

11. The R/C frequencies are set forth at Section 95.207 of the Commission's rules. Although no changes are proposed to Part 95 of the Commission's Rules in the present proceeding, the R/C frequencies specified therein will be adversely affected by this proceeding.

12. There are three groups of R/C frequencies: 6 frequencies at 27 MHz, in between Citizens Band frequencies, that may be used to control any type of model[1/]; 50 frequencies at 72 MHz that may only be used for the control of model aircraft and rockets; and 30 frequencies at 75 MHz that may only be used to control model surface craft, such as boats and 4-wheel vehicles. (Models may also be controlled on frequencies in the Amateur Radio Service, if the operator holds the appropriate Amateur operator's license. No individual operator license is required for operation on the other R/C frequencies.) It is the 72 and

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1/ Operation of model aircraft in the 27 MHz band is not recommended by the Academy because of potential interference from Citizens Band operations.

75 MHz frequencies that stand to be adversely impacted in the present proceeding.

13. At the present time, Section 90.257 of the FCC's rules governs the land mobile 72-76 MHz band. Subsection (a)(1) sets forth the frequencies, in MHz, that may be used for fixed operations with a maximum of 300 watts power:

> 72.02, 72.04, 72.06, 72.08, 72.10, 72.12, 72.14, 72.16, 72.18, 72.20, 72.22, 72.24, 72.26, 72.28, 72.30, 72.32, 72.34, 72.36, 72.38, 72.40, 72.42, 72.46, 72.50, 72,54, 72.58, 72.62, 72.64, 72.66, 72.68, 72.70, 72.72, 72.74, 72.76, 72.78, 72.80, 72.82, 72.84, 72.86, 72.88, 72.90, 72.92, 72.94, 72.96, 72.98, 75.42, 75.46, 75.50, 75.54, 75.58, 75.62, 75.64, 75.66, 75.68, 75.70, 75.72, 75.74, 75.76, 75.78, 75.80, 75.82, 75.84, 75.86, 75.88, 75.90, 75.92, 75.94, 75.96, 75.98

Subsection (b)(1) makes the same frequencies available for low power, mobile use in certain land mobile radio services. Subsection (b)(2) limits the transmitter output power to 1 watt. Subsection (c) provides:

> Radio remote control of models is permitted on frequencies <u>10 kHz removed</u> from these frequencies authorized for fixed and mobile operations in the 72-76 MHz band. Remote control operations are secondary to operation of fixed and mobile stations as provided for in this section. (Emphasis added.)

Proposed Rules for Operations at 72-76 MHz

14. Present rule 90.257(a)(1), fixed operations, would be replaced by proposed rule 88.1189. Present rule

90.257(b)(1), mobile operations, would be replaced by proposed rule 88.907(d). Present rule 90.257(b)(2), power, would be replaced by proposed rule 88.909(b). **Present rule 90.257(c), remote control of models, would be deleted.** However, the frequencies permitted for R/C use would continue to be authorized by virtue of rule 95.207 (see para. 11, above).

15. The deletion of all reference in Part 88 to the R/C use of frequencies in the 72-76 MHz band is unwise and unsafe. Although the operating rules for the R/C service may not belong in Part 88, Part 88 should continue to refer to the presence of R/C activity in the band. The Academy also believes that the specific R/C frequencies should be added to the Combined Frequency List, found at proposed rule 88.1501. The R/C Service and the land mobile services have a long history of co-existence in this band and specific reference to the R/C channels would enable applicants and frequency coordinators to continue to take into account the presence of the R/C channels. In this way, the potential for interference and potential unsafe flying conditions can be minimized.

16. For fixed operations, there is no change proposed. The frequencies in proposed rule 88.1189 are exactly the

same as the frequencies in existing rule 90.257(a)(1), ten kilohertz away from R/C frequencies. The R/C community has successfully coexisted with these fixed stations by using appropriate operating procedures and narrow band R/C equipment. Rule 88.1263, which will authorize radio call box operations on these frequencies is not a concern, since these too are located 10 kHz away from R/C operating frequencies.

17. The proposed change in the spectrum location of the mobile frequencies is the problem. The frequencies in proposed rule 88.907(d) reflect the channel splitting that is the essence of this proceeding. Instead of being 10 kHz removed from the R/C frequencies, land mobile frequencies would be 2.5 kHz removed from the R/C frequencies. Moreover, their relatively loose proposed frequency stability of 50 parts per million (See proposed rule 88.425(a), Table C-2) permits the signal to actually take up 3.6 kHz --- enough to be exactly on the R/C frequency only 2.5 kHz away. Even if their stability were tighter, a land mobile signal would still be a serious interference threat.

18. The practical effect of this regulatory environment is that, whenever a land mobile transmitter is used near an R/C transmitter on a frequency only 2.5 kHz

away, the land mobile transmitter will override the R/C transmitter and the operator will lose control of the model. Contrary to a popular misconception, land mobile use of frequencies in the 72-76 MHz band is not limited to locations away from R/C operating sites, such as in-plant operations and it certainly will not be so limited under the proposed rules. According to Subpart F, Section 88.1501, of the proposed rules, the frequencies in this band will be General Category frequencies. As such, proposed rule 88.21 makes these frequencies available for Public Safety, Non-Commercial and Specialized Mobile Radio (i.e. commercial, for-profit service provider) use. They may be used for either data or voice. Rule 88.907(a). Thus, their use near urban flying sites and public recreational areas is not only permitted but is also likely, making the loss-of-model-control scenario a highly likely occurrence.

Industry Impact

19. The R/C modeling hobby industry has a billion dollars in annual sales. It is not unusual for a participant in aeromodeling to have $5,000 invested in various models, accessories, tools and hardware. The industry has average annual sales of approximately 194,000 transmitters and 210,000 receivers for the 72 MHz (model

airplanes) band. Equipment for the 75 MHz (model surface craft) band runs to 340,000 transmitters and 360,000 receivers, sold annually. At an average cost of $200 per transmitter/receiver, the 72 MHz market totals $40 million in annual sales and the 75 MHz market totals $70 million in annual sales. It should be emphasized that these figures reflect only the radio controls, which may comprise only about 30% of the investment in an R/C model.

20. The Commission's proposal in this proceeding has the potential to undermine the presently stable R/C environment in the 72-76 MHz band. In a nutshell, the proposed rules create the possibility that 1-watt land mobile transmitters may be employed in proximity to R/C modeling activity at random and without warning. The technical characteristics proposed in the rules are such that the land mobile transmitter would always override the R/C transmitter, causing loss of control of the model. In such an uncertain rf environment, safety risks would be enormously increased, as would the potential for damage to the model and other property. The decline of the hobby and the entire industry is predicted, since participants would be unwilling to continue to operate in this rf environment.

21. The Academy believes that, merely because the R/C Radio Service is largely recreational, it should not relegated to a position of unimportance. If the recreational value of land were discounted, there would be no parks or golf courses; only factories and high-rise office buildings. Similarly, the recreational value of the spectrum should be recognized and preserved. In the vast scheme of things, the R/C Radio Service uses only a minuscule amount of spectrum. But this spectrum supports a valuable, recreational activity which should not be diminished in the interest of commercial usage. The impact of the Commission's proposal on the R/C Radio Service is completely out of proportion to the improvement that the Commission is seeking to derive.

Safety Impact

22. Radio-controlled models, especially model aircraft, are capable of causing serious personal injury and property damage. The average model aircraft weighs between 5 and 12 pounds, with wing spans of 4 to 6 feet. Models typically fly at between 50 and 90 miles per hour. Model aircraft are frequently flown at organized events where there are numerous spectators. Thus it is absolutely

critical that the operator of the aircraft be able to control its flight at all times.

23. The model itself may represent a considerable investment by its owner, not only in terms of dollars, but also in terms of effort and care. While the majority of models are built from kits, a scratch-built model may require over 1,000 hours to complete. The crash of a model, even if no injury or damage is caused to others, usually represents a considerable loss to the modeler.

24. For these reasons, the Academy has promulgated safety regulations that are intended to eliminate the danger of an accident due to radio frequency interference. For example, the Academy recommends a 5-mile separation between flying sites, and requires use of certified narrow band R/C equipment. For coordination of frequency usage at the flying sites, the Academy has established frequency management plans that permit the safe usage of the maximum number of frequencies. Some $60,000 worth of monitoring equipment has been deployed in the field to promote compliance with the Academy's guidelines.

25. The Commission's regulations, if adopted, would undermine and negate these efforts. The margins of safety

that are intended to be provided by these voluntary safety codes would be reduced for two reasons. First, more modelers will be crowded onto the frequencies that are not proposed to be bracketed by land mobile frequencies. Increased congestion equates to a greater likelihood of interference by one modeler to another, since human error in the use and coordination of frequencies always is possible. Second, for modelers who continue to use the bracketed frequencies, there is increased danger of loss of control due to the unexpected appearance of a land mobile transmitter in the area.

26. The Academy also requests the Commission to consider the impact of its new regulations on the installed equipment base. When the Commission eliminated the individual licensing of R/C operators, the reasoning was that this service could be adequately regulated through equipment regulations, such as the type-acceptance regulations, rather than through operator licensing. Not long thereafter, the Commission authorized the 80 channels in the 72-76 MHz band. Now there are hundreds of thousands of 72-76 MHz R/C systems in use throughout the country. Many of the people operating these systems are not members of any modeling organization and have no concept or awareness of the FCC's regulations. Accordingly, the

Commission should realize that awareness of the impact of changes in the 72-76 MHz band will be uneven. More importantly from a safety standpoint, the Commission should be very reluctant to create regulations that will place these people and those around them at risk with virtually no warning of the changed radio environment.

Technical Considerations

27. As a result of the channel splitting under the Part 88 proposal, instead of being separated from the low-power mobile frequencies by 10 kHz, the majority of the R/C frequencies would be removed from land mobile frequencies by only 2.5 kHz. As was the case when these frequencies were 10 kHz removed, the allowable power of these mobiles will continue to be 1 watt (See proposed rule 88.909(b)), whereas the allowable power of an R/C transmitter is .75w (See rule 95.635(b)(3)).

28. In actuality, the disparity in power is exaggerated by real-world considerations. A one-watt land mobile station can be powered by the vehicle's 12-volt system and the signal can transmitted via a vertical, roof-mounted antenna. An R/C transmitter, however, rarely produces .75 watts because these are exclusively hand held

devices where weight and portability dictate the use of low capacity, rechargeable battery packs. Moreover, the antenna is held at various angles. The result is that, although the two services are permitted comparable power, in actuality the R/C service operates at far less radiated power than the land mobile service.

29. A second fact of operational reality acutely affects the aeronautical modeling activity on 72 MHz. The important fact is that the receivers in these models are employed **above the ground**. A typical model can be flown to an altitude of 400'. An operator can maintain visual contact with a model for up to a quarter of a mile. Thus the receiver can be a considerable distance from the controlling transmitter. While it is in the air, the receiver can "see" a multitude of signals. Any signal on or near the frequency the receiver is "looking for" will capture the receiver, causing the proper transmitter to lose control.

30. Under the circumstances that are about to be created, land mobile transmitters, legally operating near or on R/C frequencies, will be a common occurrence. So, too, will be out-of-control models. Surface models can be found in operation on any shopping center parking lot,

neighborhood cul-de-sac, or local pond. Model airplanes usually require more open space, but sailplanes and electric motor powered models can often be found in operation in parks and playgrounds. School yards are especially popular locations for operation of model helicopters. Often a modeling club will use an industrial area for its operations --- a circumstance that has avoided noise problems, but which now could bring the models into proximity with the new breed of industrial land mobile transmitters.

31. In the case of the 72 MHz frequencies, 31 of the 50 frequencies, over 60%, would be bracketed on at least one side by a land mobile frequency only 2.5 kHz away. In the case of the 75 MHz frequencies, 10 of the 30 frequencies (33%) would be bracketed. The immediate impact of the Commission's proposal on manufacturers --- and it is already being felt --- is that operators will not purchase new equipment until the likelihood of interference can be determined. Eventually operators will migrate to the channels that are not bracketed by new land mobile channels. This will result in intolerable frequency congestion, the very condition which in the past prompted the Commission to authorize these 80 R/C channels and which prompted the voluntary narrow banding project to permit the simultaneous, co-located use of these channels.

Conclusion

32. With respect to the R/C channels in the 72-76 mHz band, the Commission's proposal is a step backwards. It would undo years of progress toward maximizing the efficient use of spectrum by an industry which took seriously its obligation to operate in the public interest. The "gains" being made in terms of a greater number of land mobile channels in the 72-76 MHz band are an illusion. There is no real gain if one group of users benefits at the expense of another group of users. There is only a shifting of frequency congestion.

33. The Commission's stated goal in this proceeding is to accomplish its objective with minimal or no impact on existing users. Yet, as we have shown above, that will not be the case with the R/C modelers. If the Commission's rules are adopted as proposed, the R/C modelers will suffer the effective loss of over half their channels. This result is clearly not consistent with the Commission's stated objectives.

34. In view of the above, the proposed rules should be revised to continue to refer to the R/C channels in the 72-76 MHz band. The channels used by the R/C Radio Service

should be excepted from the land mobile channel-splitting scheme, by maintaining the 10 kHz separation from the land mobile frequencies.

35. The recreational use of the radio spectrum for remote-control modeling is no less valuable than commercial use of the spectrum, just as the recreational use of land for parks and recreation is no less valuable than commercial use of land. In balance, there is a place for both. In the 72-76 MHz band, the balance was reached some years ago and, over time, experience has shown it to be the right balance. The Commission should not now ignore this experience and devalue the recreational use of a minute sliver of spectrum.